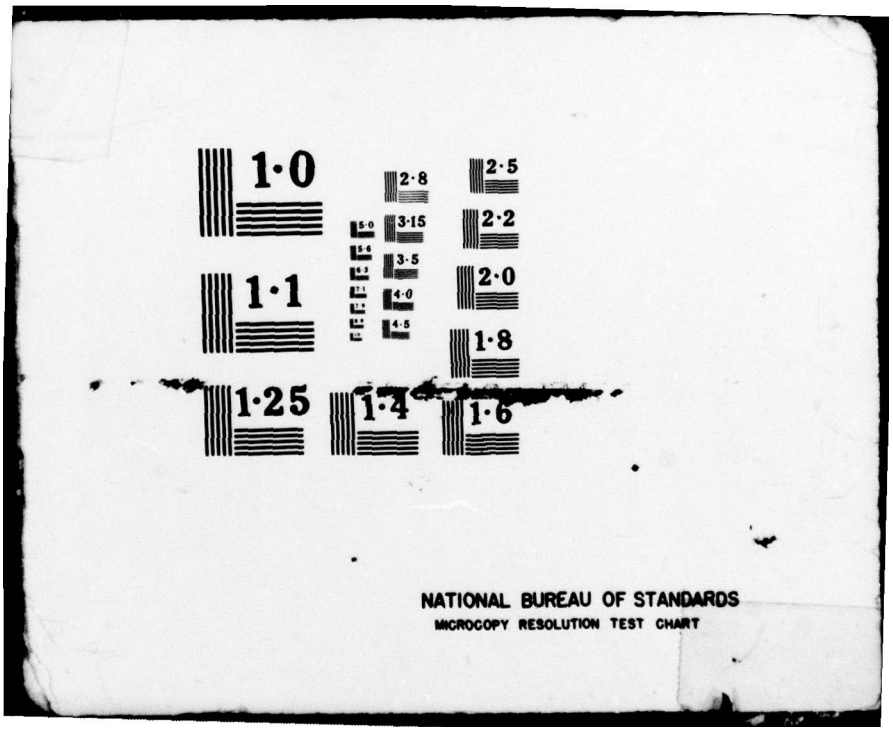
AD-A069 854 COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER NH F/G 13/2
ALGOLIZATION OF WASTEWATER WITH SUBSEQUENT USE FOR IRRIGATION (--ETC(U)
MAY 78

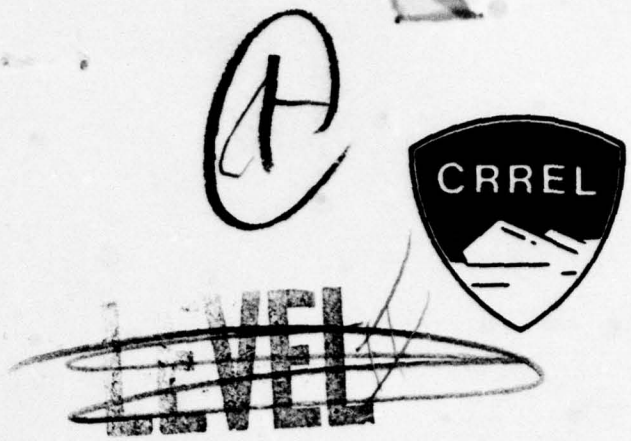
UNCLASSIFIED CRREL-TRANS-68 NL

| OF |
AD
A069854

END
DATE
FILMED
7-79
DDC


1·0
1·1
1·25
2·8
3·15
3·5
4·0
4·5
1·4
2·5
2·2
2·0
1·8
1·6
NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

Draft Translation 689



ALGOLIZATION OF WASTEWATER WITH SUBSEQUENT USE FOR IRRIGATION

May 1978

CORPS OF ENGINEERS, U.S. ARMY
COLD REGIONS RESEARCH AND ENGINEERING LABORATORY
HANOVER, NEW HAMPSHIRE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Draft Translation 689	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) ALGOLIZATION OF WASTE WATER WITH SUBSEQUENT USE FOR IRRIGATION		5. TYPE OF REPORT & PERIOD COVERED 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Cold Regions Research and Engineering Laboratory Hanover, New Hampshire		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE May 1978 13. NUMBER OF PAGES 4p.
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

WASTEWATER
IRRIGATION

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The need for the treatment (decontamination) of residential and urban waste water for irrigation purposes is dictated by the need to protect the environment from pollution and insure the rational utilization of water resources. This report discusses the purification of wastewater prior to use in irrigation.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

[redacted]

DRAFT TRANSLATION 687 (11) May 78 (12) 7p.

(6)

ENGLISH TITLE: ALGOLIZATION OF WASTEWATER WITH SUBSEQUENT USE FOR IRRIGATION

FOREIGN TITLE: (AL'GOLIZATSIYA STOCHNYKH VOD POSLEDUYUSHCHIM ISPOL'ZOVANIYEM NA OROSHENIYE).

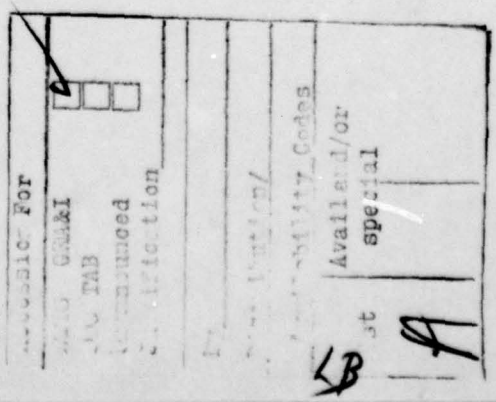
AUTHOR: None

(21) Trans. of mono;

SOURCE: Kupavna, ~~Ministry of amelioration and water utilisation, All Union Scientific Research Institute for Utilisation of Wastewater in Agriculture, 1975, 7p.~~ (USSR) 7p 1975.

Translated by Office of the Assistant Chief of Staff for Intelligence for the Office of Corps of Engineers, 1978, 4p.

NOTICE



037 100

LB

ALGOLIZATION OF WASTE WATER WITH SUBSEQUENT USE FOR IRRIGATION

Kupavna AL'GOLIZATSIYA STOCHNYKH VOD S POSLEDUYUSHCHIM ISPOL'ZOVANIYEM NA OROSHENIYE in Russian 1975 pp 1-7

The need for the treatment (decontamination) of residential and urban waste water for irrigation purposes is dictated by the need to protect the environment from pollution and insure the rational utilization of water resources.

The fertilizing value of residential and urban waste water is well known. Extensive experience has been acquired in its effective utilization on irrigation farming fields (IFF). However, we are also familiar with the fact that they carry agents of infectious human diseases and helminth eggs (Dolivo-Dobrovol'skiy, Kul'skiy, and Nakorchevskaya, 1971). Whereas it was previously believed that pathogenic bacteria and helminth eggs, penetrating into the soil with waste water perish rapidly, modern scientific data totally refute the concept. Thus, it has become apparent that the agents of typhoid fever may be preserved in polluted soil up to 1 year; of dysentery, up to 45 days; of poliomyelitis, 2-3 months (Gorbov, 1971); cholera, up to 2 weeks; and helminth eggs up to 10 years (Mayorova, Romanenko, 1972).

That is why the irrigation of farm crops with untreated waste water may not be allowed.

The question of the purification of waste water prior to its useful irrigation is most acute in the case of small and medium size settlements. Essentially no effective and reliable purification methods have been developed for such settlements. The mechanical duplication of purification methods used in big cities fails to yield the necessary results under "minor sewage" conditions.

Most suitable among the various methods for the purification of water in small sewer systems are the natural, for they do not require highly skilled service personnel while insuring high level of purification and decontamination. Chlorination or other artificial decontamination methods are totally excluded in this case.

Again in this case the most suitable among the natural purification methods are biological ponds from which the decontaminated water is channeled into irrigation.

The All-Union Scientific Research Institute for the Agricultural Utilization of Waste Water (Dolivo-Dobrovol'skiy, Zhirkov, Yur'yev, Tereshina, and Udelis) developed a basic system for the treatment (decontamination) of waste water before its use for irrigation.

According to the system (see figure) prior to its utilization on irrigated farm land during the vegetation period, and after mechanical clarification the waste water goes into modernized biological ponds described as biological oxidation contact stabilization (BOCS) ponds.

The BOCS ponds are a series (sections) of artificially designed reservoirs. The daily amount of waste water of the settlement is consecutively channeled into each one of them. In the initial filling of each section (pond) a specially selected combination of microalgae is applied which, as a result of the pond's structure, stays in it after the water has been drained, as a kind of "starter." The second application of microalgae (algolization) is not required. The water is kept in the BOCS ponds until it has been entirely decontaminated, after which it could be used for irrigation. The role of the algae in BOCS ponds consists not only of decontamination but of the ability to insure the maximum preservation of the fertilizing value of the decontaminated water.

Наименование показателей	Единица измерения	БОКС пруды		Зимний депонент-биоокислитель	
		г.Орджоникидзеабад	г.Талсы	г.Орджоникидзеабад	г.Талсы
Объем	$м^3$	400	400	10000	80000
Экспозиция	сутки	5-7	5-11	16-23	180
Снижение бактерий группы кишечной палочки	%	99,99	99,99	свыше 99,00	свыше 99,00
Стоимость очистки $1м^3$ сточной воды	коп.	3,7	4,0	--	-
Годовой экономический эффект	руб.	17199	16375		

System for the Treatment of Waste Water Preceding its Irrigation Use

Key:

1. Small or medium sized settlement
2. Mechanical purification systems
3. BOCS ponds and winter depositor-biooxidizer
4. Irrigation farming fields
5. Emergency outlet
6. Reclamation pumping station

This is particularly assisted by the microalgae which possess the ability to fixate atmospheric nitrogen, raising its content in the water. In the presence of proper conditions the nitrogen fixation of microalgae could last over an extended period of time even after they reach the IFF with the waste water.

In the nonvegetation period the waste water is accumulated and decontaminated in the winter depositor-biooxidizer in which, in the spring, after the thawing of the ice, the set of microalgae same as the one used in BOCS ponds, is added.

Here waste water is purified and decontaminated fully effectively.

The the method for treating waste water in BOCS ponds in a winter depositor-biooxidizer was tried under industrial conditions in Central Asian weather conditions (Ordzhonikidzeabad, Tadzhik SSR, Akhangaray, Uzbek SSR), and in the Baltic (Talsy, Latvian SSR, and the Dreverna and Baragine settlements, Lithuanian SSR).

The following table provides the technical and economic indicators of some of the purification systems mentioned.

Indicator	Measurement unit	BOCS Ponds		Winter depositor-biooxidizer	
		Ordzhonikidzeabad	Talsy	Ordzhonikidzeabad	Talsy
Volume	m^3	400	400	10000	60000
Exposure	day	5-7	5-11	16-23	180
Reduction of Bacillus coli bacterial group	%	99.99	99.99	over 99.00	over 99.00
Purification cost per m^3 waste water	kopeks	3.7	4.0	-	-
Annual economic results	rubles	17199	16075		

Experience in the use of BOCS ponds and of the winter depositor-biooxidizer proved that constructions costs were 50% lower than the previously planned trip biofilters; the cost of purification declined 3.5 times. The water was entirely decontaminated and required no chlorination. Waste water decontaminated in BOCS ponds and the winter depositor-biooxidizer is used in cotton crop irrigation (Ordzhonikidzeabad) and in the experimental irrigation of perennial grasses (Talsy).

The algolization of waste water in biological ponds calls not only for insuring the safety of the water supplied to IFF from the medical-epidemiological

viewpoint but the preservation and even enhancement of its fertilizing value. Irrigation with contaminated waste water substantially increases yields of fresh perennial grasses and cotton.

The results of the operations of the BOCS ponds under Tadzhik weather conditions were summed up in the "Provisional Recommendations" for the designing of biological oxidation contact stabilization (BOCS) ponds in the Tadzhik SSR, suitable for small settlements. The recommendations were coordinated with the Tadzhik SSR Ministries of Health and Water Resources.

The waste water treatment method using BOCS ponds has been applied in the RSFSR, and the Tadzhik, Uzbek, Lithuanian, Latvian and Estonian SSR's.